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Andersen, K.

On some new or little-known bats of the genus Rhinolophus in the collection of the Museo Civico, Genoa.

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ON SOME NEW OR LITTLE-KNOWN BATS OF THE GENUS RHINOLOPHUS IN THE COLLECTION OF THE MUSEO CIVICO, GENOA.

By KNUD ANDERSEN

PLATE III.

The bats which form the subject matter of the present paper were submitted to me for identification by Marquis Giacomo Doria. Two of the species *(Rh. fallax* and *cognatus)* are new to science; a third and fourth *(Rh. keyensis* and *alcyone*), though named, have never been properly described; a fifth, sixth, and seventh *(Rh. acrotis, lobatus*, and *andreinii)* were obtained in localities from which the species had not hitherto been recorded.

1. **Rhinolophus fallax**, sp. n

(Pl. III figs. 1-7.)

Type. — ♂ ad., preserved in alcohol. Ighibirei, on the Kemp Welch River, some little way inland, British New Guinea. Collected by Dr. Lamberto Loria (¹), 1890. Museo Civico, Genoa. — The only specimen known.

Horse-shoe markedly broader than in *Rh. megaphyllus;* no tooth-like projection on either side of the median notch. Supplementary leaflet almost completely covered by the margins of the

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(¹) An account of the mammals obtained by Dr. L. Loria in New Guinea was given by Mr. Oldfield Thomas in the Ann. Mus. Civ. Genova (2) XVIII, Dec. 1897. The specimen here under consideration was inadvertently omitted when the collection was sent to London (Marquis Doria, in litt.).

Sw

horse-shoe. Sella of the *megaphyllus* type: decidedly broader at base than at summit, and distinctly constricted at middle; height of sella, from angle between vertical portion and nasal lobe, about 4.8 mm.; width at base 2.8, at summit 2.2 mm.; summit broadly rounded off; front face of sella practically naked (by means of a lens a coat of exceedingly short white hairs is observable). Posterior connecting-process low and rounded, inserted a little below the summit of the sella. Lancet almost cuneate, the lateral margins being but slightly emarginate. Connecting-process and the whole of the posterior leaf densely haired. — Three mental grooves, as in all primitive species of *Rhinolophus*.

Ears of the *megaphyllus* pattern: rather long and broad, reaching a little beyond the tip of the muzzle when pressed forwards; width of ears very nearly equal to the distance from the notch on the outer margin to the tip.

Wing-structure (compare the wing-indices below, p. 195) as in all primitive members of the *Rh. simplex* group: fourth metacarpal a trifle longer than fifth, third slightly the shortest; second phalanx of third digit less than $1\frac{1}{2}$ the length of the first phalanx; second phalanx of fourth and fifth digits a little longer than first phalanx.

Wing-membranes inserted very nearly on the tarsus. Tail a little longer than the lower leg. Posterior margin of uropatagium, owing to the shortness of the tail, somewhat concave. Tip of tail projecting about 1 mm., a character which, judging from other species of the genus, no doubt is subject to a certain amount of individual variation.

Skull essentially as in *Rh. megaphyllus*, but rather larger, more heavily-built and especially with broader brain-case (see the measurements below of mastoid width and width of brain-case). The teeth will probably prove to be a little larger, at least on average.

Dentition (¹): — p_3 is situated in the tooth-row, but a little towards the external side; the tooth is blunt, without cusp, scarcely higher than the cingulum of p_4. p_2 and p_4 well separated. p^2 completely in row, with a distinct cusp, pointing inwards; height

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(¹) On the homologies of the premolars in the genus *Rhinolophus*. see Proc. Zool. Soc. London 1905, II. p. 77, footnote.

of the tooth not less than $\frac{1}{3}$ of p^4. Upper canine and p^4 widely separated.

Affinities. — *Rh. fallax* is closely related to *Rh. megaphyllus* from the Australian Continent and the Louisiade Archipelago. In all important respects the two species are on the same level of development. But externally *Rh. fallax* is readily distinguished by its broader horse-shoe. The small cranial differences between the two species have already been mentioned. The dentition is on a similarly primitive stage as in *Rh. megaphyllus*, showing the same broad interspace between the upper canine and p^4, and the same comparatively well developed p^2.

In my geographical review of the species and subspecies of *Rhinolophus* I wrote, a few months ago (¹): — « As yet no species is known from New Guinea, although the genus is represented both east (Louisiade Archipelago), south (Australia, Key Islands), and west (Moluccas) of the island ». This gap in our knowledge is filled up by the discovery of *Rh. fallax*.

The Key Islands are, so far as hitherto known, inhabited by three species: *Rh. keyensis*, *Rh. achilles*, and *Rh. euryotis*; Australia by one only, *Rh. megaphyllus*. It is not improbable that those groups of the genus, viz. the *philippinensis* and *arcuatus* groups, to which *Rh. achilles* and *Rh. euryotis* belong reach their extreme southeastern limit in the Key Islands, Timor Laut, and Aru Islands, and it might therefore, a priori, be anticipated that when once a species of *Rhinolophus* was discovered in New Guinea, it would, like *Rh. keyensis* and *Rh. megaphyllus*, be a very primitive representative of the *Rh. simplex* group. This has now proved to be the case.

We are now able to trace the modifications of the *simplex* type from Lombok *(Rh. simplex)*, through New Guinea *(Rh. fallax)*, to Australia *(Rh. megaphyllus f. typica)*, and the Louisiade Archipelago *(Rh. megaphyllus monachus)*. But we still lack all knowledge of those representatives of the same type which undoubtedly inhabit the chain of islands east of Lombok, viz. Sumbawa, Sumba, Flores, Timor, Timor Laut, and the Aru Islands.

(¹) Knud Andersen, « A List of the Species and Subspecies of the Genus *Rhinolophus*, with some Notes on their Geographical Distribution »; Ann. & Mag. Nat. Hist. (7) XVI. p. 653 (Dec. 1905).

Measurements of *Rh. fallax* and *megaphyllus*.

	Rh. fallax.	*Rh. megaphyllus.*		
	♂ ad. Type.	f. *typica* 11 adults, 5 skulls.		*monachus.* ♀ ad. Type.
		Min.	Max.	
	mm.	mm.	mm.	mm.
Ears, length	19.5	18	19.5	19.8
» greatest breadth	16	13.5	15	15
Horse-shoe, breadth	10.5	8.8	9.8	8.8
Forearm	48.5	46.5	50	46
3rd digit, metacarpal	34.7	33.8	36	32.7
» 1st phalanx	13.6	13	14.6	13.2
» 2nd phalanx	19	17.5	20	17.8
4th digit, metacarpal	35.7	34.3	36.8	33.5
» 1st phalanx	10.7	9.8	11.2	9.7
» 2nd phalanx	12.5	11.5	13.3	10
5th digit, metacarpal	35	34.3	36.5	32.7
» 1st phalanx	11.7	10.4	12.7	10.2
» 2nd phalanx	12.5	11.7	14	11.7
Tail	23.8	22.2	26.8	20.5
Lower leg	21	18.5	22	19
Foot, with claws	10	9	10.2	8.7
Skull, total length to front of c	21.2	19.9	20.5	19.3
» basilar length to front of c	17.5	16.3	17.3	16.9
» mastoid width	10.3	9.8	9.8	9.5
» width of brain-case	9	8.5	8.6	8
» zygomatic width	10.3		10	9.6
» maxillary width	7.6	7	7.6	7.2
» across cingula of c	5.7	4.8	5.2	5.1
» width of nasal swellings	6	5.8	6	5.7
Mandible	14.5	13.3	14	13.2
Upper teeth	8.2	7.7	8.1	7.3
Lower teeth	9	8.2	8.7	8

2. **Rhinolophus keyensis**, Ptrs.

1871. *Rhinolophus keyensis,* Peters, M B. Akad. Berlin, p. 307.

1881. *Rhinolophus megaphyllus* (non Gray), Peters & Doria, Ann. Mus. Civ. Genova XVI. p. 692.

1905. *Rhinolophus keyensis,* Knud Andersen, Proc. Zool. Soc. London, 1905, II. p. 79, footnote; Ann. & Mag. Nat. Hist. (7) XVI. pp. 648, 653 (Dec. 1905).

♀ ad., preserved in alcohol. Key Islands. Collected by Dr. O. Beccari. Museo Civico, Genoa. (This is the specimen referred to by Peters and Doria in 1881, l. s. c.).

In 1871, in his well-known list of the species of Horseshoe-Bats (l. s. c.), Peters gives as the habitat of *Rh. megaphyllus* N. E. Australia and the Key Islands; from the former place he had two examples in the Berlin Museum (n.^{os} 3240 and 3291);

from the latter group of islands he had only seen « ein Exemplar in dem Leidener Museum, eine vielleicht nur etwas kleinere Varietät oder Art *(Rh. keyensis)* bildend, worüber zu entscheiden aber mehrere Exemplare erforderlich sein würden. » This is the only description of *Rh. keyensis* ever published, and vague though it is we have, from a technical point of view, no other choice than to regard the example in the Leiden Museum seen by Peters as the « type » of *Rh. keyensis.* Whether this specimen still exists, is unknown to me; in Dr. Jentink's « Catalogue systématique des Mammifères » (Mus. d'Hist. nat. Pays-Bas XII. p. 161; Leiden 1888) no example of « *Rh. megaphyllus* », nor any example of a bat allied to *megaphyllus,* from the Key Islands is registered.

Later on, Prof. Peters must either have forgotten his remark on *Rh. keyensis,* or he must have given up his attempt to separate it from *Rh. megaphyllus;* in 1881 (l. s. c.) he records « *Rh. megaphyllus* » from the Key Islands, without any reference to the hypothetical *Rh. keyensis.*

In these circumstances I was much pleased to find among the *Rhinolophi* submitted to me for examination by Marquis Doria a bat of the *megaphyllus* type from the Key Islands. It proves to be a distinct species, which may be briefly diagnosed as follows:

A very primitive member of the *Rh. simplex* group, apparently closely allied to *Rh. nanus* (1) from Goram, with which it agrees in the form of the sella, but differing, externally, by its smaller size and broader horse-shoe. The skull (incomplete) comes nearest to that of *Rh. nanus,* but the teeth are a trifle smaller.

p_3 is external to the tooth-row, very small, blunt, about as high as the cingula of the adjacent premolars. p_2 and p_4 in contact. p^2 in row, with a minute cusp (scarcely observable without a lens), pointing inwards.

At present the following primitive species of the *Rh. simplex* group are known: — *Rh. simplex* (Lombok), *Rh. fallax* (New Guinea), and *Rh. megaphyllus* (Australia, Louisiade Archipelago); in these species the sella is quite distinctly constricted at the middle. Southwest and west of New Guinea we find the constriction gradually obliterated, the lateral margins of the sella becoming approximately parallel; to this type belong the peculiarly coloured *Rh. truncatus* (Batjan), and the very slender-skulled *Rh. keyensis* (Key Islands) and *Rh. nanus* (Goram). Finally, *Rh. celebensis* forms, in certain cranial characters, a transition to *Rh. borneensis*, which latter species again leads up to the Oriental, Ethiopian, and Palæarctic representatives of the group.

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(1) KNUD ANDERSEN, Proc. Zool. Soc. London, 1905, II. p. 82, pl. III. fig. 3.

Measurements of *Rh. keyensis* and *nanus*.

	Rh. keyensis.	*Rh. nanus.*
	♀ ad.	Ad. Type.
	mm.	mm.
Ears, length	17.5	
» greatest breadth	14.5	
Horse-shoe, breadth	9	(ca. 7.5)
Forearm	41.5	43.3
3rd digit, metacarpal	28.7	30
» 1st phalanx	12.3	11.2
» 2nd phalanx	17	
4th digit, metacarpal	29.4	31.1
» 1st phalanx	9	8.8
» 2nd phalanx	10.3	
5th digit, metacarpal	28.8	31.1
« 1st phalanx	9.7	9
» 2nd phalanx	10	9.8
Tail	20.3	
Lower leg	17	
Foot, with claws	8.8	
Skull, width of brain-case		7
» maxillary width	6.6	7
» across cingula of c	4.6	4.8
» width of nasal swellings	5	4.9
Mandible	12.2	13
Upper teeth	6.8	7.2
Lower teeth	7.2	7.8

3 a. **Rhinolophus acrotis**, Heugl., **typicus.**

1861. *Rhinolophus acrotis*, Heuglin, N. Act. Acad. Caes. Leop.-Car. XXIX. p. 10.

1904. *Rhinolophus acrotis*, Knud Andersen, Ann. & Mag. Nat. Hist. (7) XIV. p. 454 (Dec. 1904).

1905. *Rhinolophus antinorii* (non Dobson), Senna, Archivio Zoologico II. pt. 3, p. 263, pl. XVIII. figs. 22–28 (Sept. 30, 1905).

♂ ad., ♂ imm.; preserved in alcohol. Keren, Erythrea. Collected by Heuglin. R. Natural History Cabinet, Stuttgart. The type and a topotype of *Rh. acrotis*.

♂ ad.; in alcohol. Assab, Erythrea. Collected by Sr. G. Pestalozza, July 1893. Museo Civico, Genoa.

The specimen from Assab agrees in every respect with the type of *Rh. acrotis*, from Keren.

3 b. **Rhinolophus acrotis brachygnathus**, K. And.

1902. *Rhinolophus antinorii* (non Dobson), Anderson & de Winton, Zoology of Egypt, Mamm , p. 96, pl. XVI. fig. 2.
1905. *Rhinolophus acrotis brachygnathus*, Knud Andersen, Ann. & Mag. Nat. Hist. (7) XV. p. 73 (Jan. 2, 1905).

♂ ad., in alcohol. Korosko, Upper Egypt. Collected by Messedaglia Bey. Presented to the British Museum by Marquis Doria (no. 5. 12. 15. 3).
♂ ad., in alcohol. Cairo. Collected by Panceri and Gasco. Museo Civico, Genoa.
3 ♂ ad.; in alcohol. Province of Giza, Lower Egypt. From the collections of Dr. J. Anderson and Capt. S. S. Flower. British Museum (nos. 92. 9. 9. 7 (type of *brachygnathus*), 5. 8. 8. 4–5).
♀ imm.; skin. Giza, Lower Egypt. Collected by A. L. Butler, Esq. British Museum (no. 4. 7. 8. 1).

Rh. acrotis brachygnathus was hitherto known only from the Province of Giza, Lower Egypt. The example from Korosko presented to the British Museum by Marquis Doria is of special interest as showing the range of this form to extend up the Nile Valley almost as far as the Nubian frontier.

The geographical races of Rh. acrotis. — *Rh. acrotis brachygnathus* differs from the typical form of the species in the following particulars: —

The skull is distinctly slenderer; the nasal swellings narrower. The teeth are slightly smaller, and, in conformance with this, the mandible shorter, the maxillary width (across the antero-external corners of m^3) smaller. The horse-shoe and sella seem to average a little narrower. — Up to the moment of writing this I have not seen any example intermediate between *brachygnathus* and the typical *acrotis*.

Rh. acrotis typicus is an inhabitant of Erythrea, *Rh. a. brachygnathus* of the Nile Valley, from Korosko to Cairo.

Rh. acrotis andersoni (¹), from the Eastern Egyptian Desert

(¹) *Rhinolophus andersoni*, Oldfield Thomas, Ann. & Mag. Nat. Hist. (7) XIV. p. 156 (Aug. 1, 1904). — *Rhinolophus acrotis andersoni*, Knud Andersen, t. c. p. 454 (Dec. 1, 1904); id., op. cit. (7) XV. p. 73 (Jan. 2, 1905); id., op. cit. (7) XVI. p. 649 (Dec. 1, 1905).

(22° N., 35° E.), is probably indistinguishable from the typical form of *acrotis*, but I have as yet only seen immature examples (1).

Rh. clivosus. — *Rh. clivosus* (2) differs from *Rh. acrotis* in the following particulars: —

The skull is larger, especially broader (compare the measurements of the mastoid width, the brain-case, the zygomatic width). p^2 is present, situated external to the tooth-row; only in one very aged specimen (Brit. Mus. no. 5. 11. 4. 13), with the teeth much worn down, it is absent; in all the specimens I have seen of *Rh. acrotis*, including the immature individuals, p^2 is absent. Upper canine and p^4 in close contact, as in *acrotis*.

p_3 is absent in all the 5 specimens of *clivosus* to hand, the teeth of which show very different stages of wear (from practically unworn to much worn); but in one specimen some faint trace of the alveoli is observable under a lens. So far as p_3 is concerned there is, therefore, no noteworthy difference from *acrotis*, in which I always found this premolar tracelessly wanting, irrespective of the age of the individuals.

Externally these two bats are difficult to distinguish. The horseshoe and sella may average a little broader in *clivosus*.

Affinities. — *Rh. clivosus* is closely related to the Oriental *Rh. affinis* (3). The three species, *Rh. affinis, clivosus*, and *acrotis*, illustrate three progressively higher stages in the development of the dentition: — In *affinis* p_3 is external to the row and extremely small; p^2 always in the tooth-row. In *clivosus* p_3 has disappeared (at least in all the individuals I have seen); p^2 is external to the row, exceedingly small, styliform, and sometimes lost in aged individuals. In *acrotis* both p_3 and p^2 have disappeared, even in young adults.

In the proportionate length of the metacarpals, as well as in the lengthening of the second phalanx of the third digit, *Rh.*

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(1) This fact should be borne in mind when comparing the measurements of *Rh. a. andersoni*, as given in this paper p. 6, with those of *Rh. a. typicus*. The metacarpals are probably not quite full-grown (distal epiphyses unossified), but the decisive characters of the skull and teeth are as in typical *acrotis*.

(2) The following specimens of *Rh. clivosus*, from the collection of the British Museum, have been examined: — 2 ♂ ad. (in alc.); Dobar, near Berbera, British Somaliland; presented by Mr. E. Lort Phillips (95. 5. 28. 1-2). — ♂ ad., ♀ ad. (in alc.); Wagar, S. of Berbera, British Somaliland; collected by Mr. G. W. Bury (5. 11. 4. 13-14). — ♂ ad. (in alc.); Harrar, Gallaland; collected by Mr. P. Felter; presented by Marquis G. Doria (5. 12. 15. 5). — Skulls of all the 5 examples

(3) On *Rh. affinis* see Proc. Zool. Soc. London, 1905, II. pp. 101-106, pl. III. figs. 11-13.

clivosus and *acrotis* are similar to *Rh. affinis;* but they show a pronounced tendency towards a shortening of the first phalanx of the fourth digit, to which there is no trace in *Rh. affinis.*

As proved by the above, both in the dentition and in the wing-structure *Rh. clivosus* and *acrotis* are on a higher level of development than their Oriental relative.

Measurements of *Rh. clivosus* and *acrotis.*

	Rh. clivosus.		*Rh. acrotis.*					
	5 adults, 5 skulls.		f. *typica.* 3 adults, 2 skulls.		*andersoni.* 5 immatures, 5 skulls.		*brachygnathus.* 6 adults, 4 skulls.	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Ears, length	17.8	20.6	18.3	19			16.8	18
» greatest breadth. . . .	14	15	13.2	14			13.2	14.5
Horse-shoe, breadth	7	8	7	7.8			6.2	7.3
Forearm.	46.5	51.5	46.5	49.3	43.7	46.8	45	48.2
3rd digit, metacarpal	31.5	35	29.3	32.8	27	29.5	29	32.5
» 1st phalanx	14.8	17	15.8	16.4	13.8	14.8	14.8	16
» 2nd phalanx	25	27.2	23	26	21.8	23	23	25.5
4th digit, metacarpal	33.2	37.5	31.5	35	29.7	31.2	30.8	34.3
» 1st phalanx	8.2	10.2	9.7	10	8.8	9.1	8.8	9.5
» 2nd phalanx	15	16.7	15	16.7	13.5	15.5	13.8	15.8
5th digit, metacarpal	33	37	32.2	35.2	30	32.2	31.8	34.8
» 1st phalanx	10.2	12	10.7	11.1	9.8	10	10	11
» 2nd phalanx	12.5	13	14	15	12.2	13.8	12.2	13.7
Tail	25.5	31	28	32.8			28.5	31
Lower leg	19.2	21	19.8	21.2			19	21.3
Foot, with claws	9.2	10	9.1	9.8			8.7	9.2
Skull, total length to front of c	20.7	21	20.2		18.8	19.5	18.8	19.2
» basilar length to front of c	16.3	16.8	16.1		15.2	15.8	11.7	15
» mastoid width.	9.6	9.7	9.3		9.1	9.3	9	9
» width of brain-case. . .	8.7	8.9	8.4		8	8.4	7.7	8
» zygomatic width. . . .	10.5	10.8	10		10	10.2	8.8	9.8
» maxillary width. . . .	7.7	7.8	7.8	7.8	7	7.8	7	7.2
» across cingula of c. . .	5.7	6.1	5.8	5.8	5.1	6	5	5.2
» width of nasal swellings	5.6	5.8	5.6	5.8	5.2	5.6	5	5.2
Mandible	13.8	14.2	13.8	13.8	13	13.5	12.5	13
Upper teeth.	7.6	7.8	7.7	7.8	7.6	7.8	7	7
Lower teeth.	8	8.6	8.5	8.5	8.2	8.5	7.5	7.8

4. **Rhinolophus cognatus,** sp. n.

Cotypes. — ♂ ad., preserved in alcohol. Port Blair, South Andaman Island, May 1892. Presented by Prof. E. H. Giglioli. Museo Civico, Genoa. — A second specimen (♂ ad., details as above) has been presented to the British Museum by Marquis Doria.

Allied to *Rh. refulgens* (¹), from the Malay Peninsula, with which species it agrees in the general shape of the skull, in the dentition, the form of the nose-leaves, the wing-structure (wing-indices, see below p. 195), and the size; but differing in the following respects: — The skull is larger, especially broader, with broader nasal-swellings; the teeth slightly larger; the horse-shoe broader; the sella, though quite of the same shape as in *Rh. refulgens*, markedly broader: 1.6-1.8 mm. at summit, as against 1.2-1.3 in *Rh. refulgens;* the ears longer and broader; the tibia longer.

p_3 is external to the tooth-row, with a minute cusp, a trifle higher than the cingulum of p_2. p_2 and p_4 slightly separated. p^2 in row; a small cusp, pointing inwards.

Remarks. — Hitherto only one species of *Rhinolophus* had been recorded from the Andamans, *Rh. andamanensis*, Dobson, the type of which, in the Calcutta Museum, has remained unique now for 34 years. Although very imperfectly known, *Rh. andamanensis* is no doubt closely related to *Rh. affinis superans* from the Malay Peninsula. — As will be observed from the above, the second species, *Rh. cognatus*, now added to the list also gives evidence of the close affinity of the mammalian fauna of those islands with that of the Malay Peninsula.

Thus, the Andamans are now known to be inhabited by one representative of the *Rh. simplex* group *(Rh. andamanensis)*, and one of the *Rh. lepidus* group *(Rh. cognatus)*. It is very likely that also a bat of the *Rh. philippinensis* group (viz. *Rh. trifoliatus*, or some allied form) will be found in the islands.

The Andamans and Nicobars are surrounded by water of considerable depth, a fact which may indicate that these islands have for a comparatively long period been separated from the mainland. In discussing the origin of mammalian life in this Archipelago, Mr. Gerrit S. Miller comes to the conclusion that « as yet no species are known whose origin may be referred to the remote period of this land connection..... Such mammals as are now known are evidently of *very recent origin*, as in scarcely an instance has their differentiation progressed further than in the case of members of the same genera found on islands lying in shallow

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(¹) Proc. Zool. Soc. London 1905, II. p. 124, pl. IV, fig. 16 a, b, c.

water. The question at once arises, therefore, as to the means by which they have arrived where they now are. *Flight from the mainland would readily account for the distribution of the bats* » (¹); & c.

Let us now see how far these two suggestions — viz. that all the mammals of the Andamans and Nicobars are of very recent origin (i. e. not dating back to the period of land connection), and that, consequently, the bats now inhabiting the islands are descendants of individuals which in very recent time, when the distribution of land and water was not essentially different from what now obtains, have crossed the intervening sea — are supported by our knowledge of the bat fauna of the Archipelago. It must of course be admitted, at once, that the facts on which to base our conclusions are as yet rather fragmentary; but either we must altogether abstain from discussing the question, or we must argue from the material available, unsatisfactory though it is.

The Microchiroptera known to inhabit the Andamans and Nicobars, nine in number, may, for the purpose of the present investigation, conveniently be placed under three categories; — First, *Scotophilus kuhlii* (alias *temminckii*), *Tylonycteris pachypus*, *Pipistrellus tickelli*, and *Miniopterus pusillus*: these four species *might seem* to support Mr. Miller's opinion, in so far as they are *stated to be* common to the Andaman-Nicobars and to some part or other of continental Asia; but it must be remembered that Andaman or Nicobar individuals of these species (which also by Miller were quoted from literature only) have not, as yet, been sufficiently closely compared with examples from the mainland; it is therefore by far safer, for the present purpose, to leave them quite out of consideration. Second, *Rhinolophus andamanensis* and *Hipposiderus nicobarensis*, each of them known from one specimen only; the former is, as already mentioned above, closely related to, but either specifically or subspecifically distinct from, *Rh. affinis superans* from the Malay Peninsula and Sumatra; the latter is a bat of the *H. diadema* type, but indubitably a distinct species. Third, *Pipistrellus camortae* and *Hipposiderus nicobarulae*; these are the only

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(¹) Gerrit S. Miller, Jr., The Mammals of the Andaman and Nicobar Islands, Proc. Un St. Nat. Mus. XXIV, p. 791; 1902. — The italics, in the above quotation, are mine.

Microchiroptera from the islands examined by Mr. Miller himself, and he found them to be different from the mainland species. To these must now be added *Rhinolophus cognatus*, as a bat closely allied to, but specifically different from, a Malacca species (1).

To sum up: — All the species of Microchiroptera from the Andamans and Nicobars (five out of the nine recorded) which have been sufficiently closely examined have proved to be related to, but *to a more or less pronounced degree different from*, the mainland species. *This is precisely what we should expect if their origin dates back to the period of land connection;* long and complete separation from the main stem, combined with the influence of insular isolation, has brought the latent tendency to variation in the species into activity; but neither has the separation been long enough, nor the difference in milieu great enough, to obscure their true origin. — But it is certainly not what we should expect to be the case if these bats simply in very recent time had immigrated from the mainland.

In general works on the geographical distribution of mammals bats are either put aside as more or less untrustworthy guides for the zoogeographer or entirely left out of consideration; they are supposed to possess in their power of flight a means of *dispersal* essentially different from those of other mammals, enabling them to rather easily cross channels of water that would form effectual barriers to the dispersal of other mammals; and they are consequently thought to be of comparatively little importance from a distributional point of view. There can be small doubt that this theory of an intermigration of bats between islands *which are not within easy reach of each other* requires, to say the least, considerable restriction. We have just seen that the Microchiroptera of the Andamans and Nicobars show that degree of differentiation which we might anticipate in view of their continental origin and subsequent insular isolation in a milieu not very different from that of the mainland, *but decidedly not what we should expect if, after the separation of the Archipelago, a more or less frequent intermigration*

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(1) I have not included the Megachiroptera of the Archipelago in this brief review, only because most of them are too imperfectly known. Six species have been recorded; three of them are apparently autochthonous; the others have, for reasons anything but conclusive, been identified with species also occurring elsewhere in the Oriental region.

between the mainland and the islands had taken place. A series of similar instances, from the same region of the earth, might be adduced: — *Rh. calypso* in Engaño, *Rh. circe* in Nias, *Rh. sumatranus* in Sumatra: each of these three neighbouring islands is inhabited by a distinct modification *of the same type of Rhinolophus* (the *Rh. acuminatus* type); *Rh. trifoliatus niasensis* in Nias, *Rh. trifoliatus typicus* in Sumatra; *Rh. solitarius* in Banka, *Rh. trifoliatus* in the Malay Peninsula and Sumatra; *Rh. nereis* in the Anambas Islands, *Rh. stheno* in the Malay Peninsula; *Rh. affinis nesites* in the N. Natunas, *Rh. affinis superans* in the Malay Peninsula. It will be noticed that all these islands and countries, though situated close together, are inhabited by different species of the same type, or by different local representatives of the same species; the fact would be difficult to explain on the supposition that bats are liable to cross water of considerable width; but it is easily understood when we bear in mind that all the small islands mentioned have a geological history of their own, to a certain extent different from that of the adjacent islands or mainland. — On the other hand, there is a great similarity between the bat fauna of Borneo and Malacca, of the Karimata Archipelago and Borneo, of Sumatra and Malacca; these countries are separated by comparatively shallow water, and such species as are common to all, or several, of them no doubt date back to the time of actual land connection.

So far the facts and their probable explanation. But those who are inclined to think that the present distribution of bats has to any marked degree been influenced by their power of flight, will, so far as I can see, have to confront also another series of difficulties, of a more theoretical kind. Bats (Microchiroptera) find their food inland or flying along the shore in the closest proximity to land; apart from the exceedingly few species known to be truly migratory, they have no reason to venture out over the open sea far from their haunts, and probably they never do so deliberately. It might be argued that a gale can easily carry a flying animal from one island to another even if they are separated by water of considerable width; but it should not be forgotten that under an athmospheric disturbance strong enough to deprive the bats of the control of their wings, these delicate and sensitive mammals would, most probably, not fly at all, but remain in their hiding places. However, we may assume that sometimes a bat is, involuntarily, carried seawards; if so, it would, almost invariably, be swept down by the gale into the sea and perish. We may again assume that it reaches an island; it would probably arrive there in an exhausted or seriously mutilated condition. We may suppose, once more, that it recovers; but in this case it must, in order to be the founder of a new colony, have been accompanied by, or within a reasonable space of time be followed by, an individual of the same species and the opposite sex, brought across the water under similar, exceptionally successful conditions. It appears safe to assume that this series of happy coincidences exceedingly rarely occur in nature; so rarely, indeed, that it seems very unlikely that they should have any marked influence on the geographical distribution of bats.

Measurements of *Rh. cognatus* and *refulgens*.

	Rh. cognatus.		*Rh. refulgens.*	
	2 adults, 2 skulls.		2 adults, 2 skulls.	
	Min.	Max.	Min.	Max.
	mm.	mm.	mm.	mm.
Ears, length	18	18.3	15.7	
» greatest breadth	14	14.7	12	
Horse-shoe, breadth	8.2	8.6	7.5	
Forearm.	40.3	40.7	40.6	41.5
3rd digit, metacarpal	29	29.6	28.3	29.2
» 1st phalanx	11.3	12.2	10.8	11.5
» 2nd phalanx	16	16.8	14.2	15.3
4th digit, metacarpal	29.8	30	29.2	30.2
» 1st phalanx	8.2	8.5	8.5	8.5
» 2nd phalanx	10.7	11	9.5	10
5th digit, metacarpal	29.5	29.6	28.8	29.7
» 1st phalanx	9	9.2	9	9
» 2nd phalanx	10.7	11	10	10.2
Tail	20.5	21	16.7	19
Lower leg	17	17.7	15.9	16
Foot, with claws	8.5	9	8.3	
Skull, total length to front of c	18.1	18.3	17.2	17.2
» basilar length to front of c	14.6	14.8	13.4	
» mastoid width	8.8	8.8		8.4
» width of brain case	7.6	7.8		7.8
» zygomatic width	9	9	8.3	
» maxillary width	6.7	6.8	6.5	6.7
» across cingula of c	4.8	5	4.6	4.6
» width of nasal swellings	5.1	5.2	4.8	4.8
Mandible	12.5	12.5	11.4	11.8
Upper teeth	7	7	6.3	6.8
Lower teeth	7.7	7.7	6.9	7.1

5. **Rhinolophus alcyone**, Temm.

(Pl. III figs. 8-14.)

1853. *Rhinolophus alcyone*, Temminck, Esquisses Zoologiques sur la côte de Guinée, p. 80. (Type locality: Rio Boutry, Gold Coast.)

♂ ad.; preserved in alcohol. Victoria, Cameroons. Collected by Signor Leonardo Fea, 1902. Museo Civico, Genoa.

Since 1853 the type of *Rh. alcyone*, in the collection of the Leiden Museum (¹), has remained unique, and the original description (which probably was intended to be preliminary only) being very vague and fragmentary nobody has been able to identify the species with any degree of certainty. Prof. Peters (²) regarded it as « kaum von *Rh. ferrum-equinum* verschieden »; he may have seen the type during one of his visits to Leiden, but, if so, he cannot have examined the skull and dentition. Dobson, in his « Catalogue », has no reference to *Rh. alcyone*.

An examination of the bat collected by Sr. L. Fea at Victoria, Cameroons, and sent for identification by Marquis Doria convinced me that it was a species unknown to me, but there was still the possibility that it might be Temminck's *Rh. alcyone*. To decide this question I had to apply for the assistance of Dr. Jentink, who with customary kindness favoured me with a series of cranial and external measurements of the type of *Rh. alcyone* (³) and details about its dentition. This valuable information has proved my conjecture to be correct; the Cameroon bat is a second specimen of the hitherto mysterious *Rh. alcyone*.

The following is a detailed description of *Rh. alcyone*, based on the Genoa Museum example: —

Horse-shoe broad, but not completely covering the upper lip laterally; a minute tooth-like projection on either side of the median notch. Supplementary leaflet present, but firmly connected with the upper lip. *Sella slightly pandurate;* front face densely covered with extremely short white hairs (not easily observable by the naked eye). Posterior connecting-process of the *Rh. minor* type, i. e. *projecting, like a small acute triangle, beyond the*

(¹) Jentink, « Catalogue ostéologique des Mammifères », Mus. d'Hist. nat. Pays-Bas, IX. p. 271; Leiden, 1887. — Id., « Catalogue systématique des Mammifères », Mus. d'Hist. nat. Pays-Bas, XII. p. 164; Leiden, 1888.

(²) Peters, MB. Akad. Berlin, 1871, p. 311.

(³) These measurements, for which I have much pleasure in returning my sincere thanks to Dr. Jentink, are printed in the table below, p. 190.

summit of the sella. Lateral margins of lancet slightly emarginate. Connecting-process and posterior leaf densely covered with rather long hairs. — The usual two mental warts, but no distinct mental grooves.

Ears reaching somewhat beyond the tip of the muzzle when pressed forwards; greatest width a little larger than distance from notch on outer margin to tip; outer margin, below the tip, deeply concave; tip rather blunt.

Wing-structure on a very high level of development. When comparing the wing-indices with those of a primitive species of the *simplex* and *lepidus* groups *(Rh. fallax* may serve as a paradigma of the former, *Rh. cognatus* of the latter; see wing-indices below, p. 195), the following chief points will be noticed: — First, the third metacarpal is distinctly shortened, and at the same time the fourth and fifth considerably lengthened; second, *a very strong shortening of the first phalanx of the fourth digit has taken place,* this phalanx being only between $^1/_4$ and $^1/_5$ the length of the fourth metacarpal (in all *primitive* Rhinolophi beween $^1/_3$ and $^1/_4$ of the metacarpal); third, all the distal phalanges are very much lengthened. — This wing-structure is very nearly the same as in *Rh. landeri* and *lobatus.*

Wing-membranes inserted on the tarsus.

Tail short, about equal to the length of the lower leg; tip of tail scarcely projecting beyond the membrane. Posterior margin of uropatagium, owing to the shortness of the tail, concave.

Skull of the *landeri-lobatus* pattern, but very much larger.

Dentition: — p_3 half in row, a trifle higher than the cingula of the adjacent premolars. p_2 and p_4 separated. p^2 quite in row, the cusp (unworn) represented by an exceedingly small tubercle.

Affinities. — *Rh. alcyone* is closely related to *Rh. landeri* and *lobatus,* but distinguished, primo visu, by its much larger size. For further remarks see below, under *Rh. lobatus.*

6. **Rhinolophus lobatus,** Ptrs.

1852. *Rhinolophus lobatus,* Peters, Naturwissenschaftliche Reise nach Mossambique, Säugeth., p. 41, pl. IX, pl. XIII, figs. 16, 17.

1. ♀ ad.; in alcohol. Pozzi di Sancurar, Gallaland; Febr. 21, 1896. Collected by Capt. V. Bottego. Museo Civico, Genoa (¹).

(¹) This is the same specimen as recorded by Oldfield Thomas in Ann. Mus. Civ. Genova (2) XVII (Nov. 1896) p. 105 (*Hipposiderus euryale,* by a lapsus calami).

2. ♂ imm.; in alc. Mombasa, British East Africa. Collected by Mr. D. J. Wilson. Presented by Mr. G. Waller. British Museum no. 91. 9. 7. 2.
3. ♂ ad.; in alc. Fort Johnston, Nyasa; Dec. 1895. Presented by Sir Harry H. Johnston. Brit. Mus. no. 96. 10. 28. 12.
4. ♀ ad.; in alc. Shire, Lower Zambesi. Collected by Livingstone. Presented by Earl Russell. Brit. Mus. no. 63. 11. 12. 13.
5-7. ♀ ad.; in alc. Shupanga, Lower Zambesi. Presented by Dr. J. Kirk. Brit. Mus. nos. 64. 12. 10. 10–12.

The types of *Rh. lobatus,* in the Berlin Museum, are from Sena and Tette, Lower Zambesi; nos. 3-7 of the specimens enumerated above are from the same region. No. 2 extends the range of the species to British East Africa, and no. 1, from the Genoa Museum, as far as Gallaland. I am unable to see any appreciable difference between all these examples.

Affinities. — *Rh. alcyone, landeri* (¹), *lobatus,* and *dobsoni* (²) are Ethiopian descendants of the Oriental *Rh. minor* type. Their presence in Africa is an evidence, among many others, of a formerly much more intimate land-connection between South Asia and Equatorial Africa. They have, in all essential respects, preserved the cranial and dental features of the Oriental species; also the very characteristic projecting, triangular, pointed connecting-process. But they are on a considerably higher level of development in the wing-structure (see above, *Rh. alcyone*) and in the pandurate shape of the sella.

Rh. landeri and *lobatus* are very closely related. *Rh. landeri* has a shorter tibia and tail; the skull is rather more slender than, but in other respects quite similar to, that of *lobatus;* the dentition is the same. It is not unlikely that, when a completer material is to hand, we shall have to regard *Rh. landeri* and *lobatus* as western and eastern representatives of one species.

As to *Rh. dobsoni*, from Kordofan, I have some doubt that it is distinguishable from *Rh. lobatus;* but having seen only two examples of the former (the type and a topotype), both of them in not quite satisfactory state of preservation, I prefer for the

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(¹) The following specimens of *Rh. landeri* have been examined: — ♀ ad. (in alc.); Fernando Po; Zoological Society's Collection; Brit. Mus. no. 55. 12. 26. 250 (type of species). — ♀ vix ad. (in alc.); Elloby District, Gaboon; Brit. Mus no. 74. 10. 6. 6. — Skulls of both examples.

(²) OLDFIELD THOMAS, Ann. & Mag. Nat. Hist. (7) XIV. p. 156 (Aug. 1, 1904). — Specimens examined: — ♂ ad., ♀ ad. (in alc.); Kordofan; Brit. Mus. nos. 47. 5. 7. 45 and 47. 5. 7. 49 (type of species). Skull of the type.

present to leave the question open. — If *Rh. dobsoni* is, even subspecifically, inseparable from *Rh. lobatus*, the species will range from Kordofan and Gallaland in the north to Lower Zambesi in the south. There would be nothing very surprising in this wide distribution. As I have lately pointed out elsewhere (¹), another Ethiopian Horseshoe-bat, viz. *Hipposiderus caffer* f. *typica*, covers approximately the same, or, if anything, a still wider area, ranging as it does from Kordofan and Erythrea, through British and German East Africa and Nyasaland, to Transvaal, Natal, and Pondoland.

Rh. alcyone is by far the most completely differentiated of the Ethiopian species here under consideration. In all important cranial, dental and external features it is on the same level as *landeri* and *lobatus*, but it is so much larger than the other Ethiopian representatives of this type that there can be no doubt as to its specific distinctness.

Measurements of *Rh. alcyone, landeri, lobatus,* and *dobsoni.*

	Rh. alcyone.		*Rh. landeri.*		*Rh. lobatus.*		*Rh. dobsoni.*	
	♀ ad. Type. (Dr. Jentink, in litt.)	♂ ad. Cameroon.	2 adults, 2 skulls.		6 adults, 3 skulls.		2 adults, 1 skull.	
			Min.	Max.	Min.	Max.	Min.	Max.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Ears, length		21.8	14.8	15.3	15	17.5	16	16
» greatest breadth		17.2	12.5	12.5	12.5	14	12.6	12.7
Horse-shoe, breadth		10.5	7.4	7.4	7.2	7.8	7.2	7.3
Forearm	51	52.5	43	43.5	45.7	47.2	41.2	41.8
3rd digit, metacarpal	36	36.3	29	29.8	30	32	30.2	31.8
» 1st phalanx	18	17.5	12.1	13.3	13	14	13	13
» 2nd phalanx	ca. 27	28.2	21.6	22	22.5	24	21.8	24
4th digit, metacarpal	40	40.5	32.3	32.8	33.5	36	33.8	34.5
» 1st phalanx	8	9	6	6.8	6.7	7.2	6.5	7
» 2nd phalanx		19	12.2	14.1	14	16	14	15.3
5th digit, metacarpal	40	40.5	31.7	32	32.8	36	32	33
» 1st phalanx	11.5	12	7.8	9.2	9.5	10	9.5	9.8
» 2nd phalanx		17.2	11.2	13.2	12.8	14.3	13.5	14
Tail		24	18	20.8	22.5	28.8	23.7	24
Lower leg		25.5	18	18.3	19.4	21.5	20	21
Foot, with claws		12	8	8.1	8.5	9.7	9.3	9.7
Skull, total length to front of c	22	23.2	17.2	18.2	19		18.8	
Skull, basilar length to front of c		19	13.7	14.4	15		14.8	
Skull, mastoid width	11	11.2	8.3	9.1	9.3		9.1	
» width of brain-case		10	7.5	8	8.3		8	
» zygomatic width		12.2		9.2	10	10.1	9.4	
» maxillary width		8.8	6.7	7	7	7.2	6.8	
» across cingula of c		6.8	4.7	4.9	5	5.5	5	
» width of nasal swellings	6	6.3	5	5.2	5.1	5.2	5.2	
Mandible	16	16.8	11.7	12.2	12.7	13.1		
Upper teeth	8	9	6.8	7	6.8	7.2	6.8	
Lower teeth	9	10	7.2	7.5	7.3	8	7.2	

(¹) Ann. & Mag. Nat. Hist. (7) XVII. pp. 277, 281 (March 1, 1906).

I have some reason to think that also de Seabra's *Rh. angolensis* ([1]), known from one example, in the Lisbon Museum, obtained at Hanha, Angola, is a species of the *Rh. landeri* type. p^2 is stated to be in the tooth-series (« dentição como no *Rh. hipposiderus* », in the Portuguese account; « la petite prémolaire supérieure très peu saillante mais assez large et serrée entre la canine peu developpée et la seconde prémolaire longue et aigüe », in the French version); and judging from two pencil-sketches of the nose-leaves, very kindly sent me by Sr. de Seabra, the connecting-process is projecting and pointed, and the sella pandurate. These three facts combined seem to exclude all doubt as to the true affinities of *Rh. angolensis.* — The fourth metacarpal measures, according to Seabra, 32 mm., the first phalanx of the fourth digit 7 mm.; in other words, this phalanx shows the strong shortening so characteristic of the bats of the *landeri* type. — The other measurements published seem to indicate that *Rh. angolensis* comes nearest to *Rh. landeri* in external dimensions, being perhaps a trifle smaller, and with a markedly shorter tibia. The skull is unknown.

If my suggestion as to the affinities of *Rh. angolensis* is correct, the *Rh. landeri* type — thus comprising *Rh. alcyone*, *landeri*, *angolensis*, *lobatus*, and *dobsoni* — is, roughly speaking, distributed in a broad belt across tropical Africa, from the Gold Coast, Kordofan and Gallaland in the north, to Angola and Lower Zambesi in the south.

7. **Rhinolophus andreinii**, SENNA.

1905. *Rhinolophus andreinii*, Angelo Senna, Archivio Zoologico II. pt. 3, p. 256, pl. XVI. fig. 1; pl. XVIII, figs. 7-16 (Sept. 30, 1905).

♂ ad.; preserved in alcohol. Harrar, Gallaland. Collected by Count Salimbeni. Museo Civico, Genoa.

The type (in Dr. Senna's private collection), from Adi Ugri, Erythrea, was hitherto the only specimen known.

([1]) A. F. DE SEABRA, Jorn. Sci. Math. Phys. Nat. Lisboa (2) V. no 20, p. 250 (Dec. 1898); and (2) VI, no. 22, p. 117 (Aug. 1900).

Rh. andreinii needs only comparison with *Rh. blasii* and *Rh. empusa* (1). From *Rh. blasii* (2) it differs as follows: —

(1) The ears are a little shorter and narrower. (2) The lateral margins of the deltoid sella are almost quite evenly converging from base to tip; on very close examination a faint indication of a constriction at the middle is observable; in *Rh. blasii* the sella is abruptly constricted at the middle (3). (3) The horse-shoe will probably, when a larger series is available, prove to be a little broader, at least on average. (4) There is scarcely any difference in the shape of the skull, but it would seem that in *andreinii* the cranium is on the whole a little more slenderly built, and the anterior maxillary width (across the cingula of the canines) slightly smaller.

p_3 is situated in the tooth-row, but somewhat towards the external side; p_2 and p_4 therefore distinctly separated. p^2 quite in row, with a distinct cusp, pointing inwards. — This dentition is as in *Rh. blasii,* with the only exception that in all the skulls of this latter species I have seen p_3 is pushed more definitely towards the external side of the row (half external or almost quite external).

Rh. andreinii is evidently more closely related to *Rh. empusa.* The two species agree in the shape of the sella and the size of the ears. But the horse-shoe is markedly broader in *Rh. empusa.* The skull is of the same size, but the parietal region in *andreinii* less globular. Dentition quite as in *empusa.*

Affinities. — The *Rh. empusa* type has originated from a bat of the Oriental *minor-subbadius* type (4). We now know three modifications, viz. —

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(1) Knud Andersen, Ann. & Mag. Nat. Hist. (7) XIV. p. 378 (Nov. 1, 1904); Id., Proc. Zool. Soc. London, 1905, II. p. 121, text — fig. 22 d.

(2) Specimens of *Rh. blasii* examined: — 2 ♂ ad., 1 ♀ ad. (in alc.); Cave of Adullam, Jerusalem; collected by Canon H B. Tristram (B. M. no. 64. 8. 17. 52-54). — 4 ♀ ad. (in alc.); Lekara, Cyprus, April 1894; presented by Lord Lilford (B. M. no. 94. 12. 1. 1-4). — Jun. (skin); Mekran Coast, Aug. 1877; collected by Capt. C. J. Bingham; presented by A. O. Hume, Esq. (B. M. no. 85. 8. 1. 112). — Ad. (skin); Syria (B. M. no. 76. 10. 20. 3). — 4 skulls, from all the localities enumerated.

(3) In Senna's excellent original account of *Rh. andreinii* (l. s. c.) the sella is described as pointed at summit, whereas in *Rh. blasii* it is « più largo e arrotondato » (see also pl. XVIII. figs. 9 and 17, in Senna's memoir). I fail to see any difference in this respect between the two species; in all the examples of *Rh. blasii* to hand the sella is as *pointed* as in *andreinii.* — Dobson's figure of the sella of *Rh. blasii* (Cat. Chir. Brit. Mus. pl. VII. fig. 7; 1878) is misleading; the constriction is by far not sufficiently emphasized; the side-view of the nose-leaves (l. c. fig. 7 a) is, as already pointed out by Senna, rather badly drawn.

(4) Knud Andersen, Proc. Zool. Soc. London, 1905, II. p. 136, and diagram on p. 138.

Rh. empusa, from Nyasaland; sella practically without constriction; ears somewhat shorter; horse-shoe very broad;

Rh. andreinii, from Gallaland and Erythrea; sella and ears as in *empusa*, but horse-shoe somewhat narrower;

Rh. blasii, from the Eastern Mediterranean countries, exclusive of Egypt; sella abruptly constricted at middle; ears somewhat longer; horse-shoe narrow; dentition (position of p_3) perhaps slightly more advanced.

The above linear (and therefore artificial) arrangement of the three species, viz. (1) *empusa*, (2) *andreinii*, (3) *blasii*, might suggest that *Rh. blasii* marks the highest stage in the chain of evolution. So far as the dentition is concerned, it may be so, *provided* the very small difference in the position of p_3, as compared with the two former species, is sufficiently constant to warrant any safe conclusion (judging from other species of *Rhinolophus* I have some doubt in this respect). But the constriction at the middle of the sella, so pronounced in *Rh. blasii*, is decidedly a *primitive* feature; we can follow it down to the most primitive species of the *Rh. lepidus* group, and so persistent is the character that we find it still preserved, though much less conspicuous, in so aberrant a species as *Rh. midas* (1), from the coast of the Persian Gulf, which also is an offshoot from the *lepidus* group, and which leads to the well-known Palæartic *Rh. hipposiderus*.

The history of the *Rh. empusa* type, as far as it can be read in the few fragments left to us, would seem to be as follows: — It has originated from an Oriental bat allied to the now existing *Rh. subbadius*, but with a deltoid sella, abruptly constricted at the middle, and a more advanced wing-structure. From South Asia this bat spread in two directions: southwestwards to Africa, westwards over S. W. Asia and the Eastern Mediterranean countries. The southwestern branch, isolated by the breaking up of the formerly more extensive land-connection between Asia and Africa, lost, almost completely, the constriction of the sella, and became differentiated into two very slightly differing species (or races), a southern (*Rh. empusa*) and a northern (*Rh. andreinii*). The western branch preserved the constriction of the sella (*Rh. blasii*).

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(1) Proc. Zool. Soc. London 1905, II. p. 138.

This constriction of the sella — however insignificant it may seem to be for a hasty inspection — is of no small interest from a phylogenetic point of view. We find a similar constriction in the most primitive members of the *Rh. simplex* group; but both in the *simplex* and the *lepidus* groups it gradually disappears in the more advanced species, or, in a still later stage, is transformed into a pandurate emargination of the lateral margins of the sella. This — in connection with the facts that in primitive species of both groups the dentition is practically identical, the cranial differences exceedingly trivial, and the wing-structure quite the same — seems to lend support to the opinion I have expressed elsewhere (1), that the ancestors of the *simplex* and *lepidus* groups must have been extremely closely related; their common origin does not lie far down in the genealogical tree of the genus.

Measurements of *Rh. empusa, andreinii,* and *blasii.*

	Rh. empusa.	*Rh andreinii.*	*Rh. blasii.*	
	♀ ad. Type.	♂ ad.	8 adults, 4 skulls.	
			Min.	Max.
	mm.	mm.	mm.	mm.
Ears, length	15.2	16.8	17.7	18.2
» greatest breadth	13.2	13.5	13.9	14.6
Horse-shoe, breadth	9	8	6.8	7.9
Forearm	48	46.5	45.5	48.6
3rd digit, metacarpal	30.8	30.2	28.8	31.2
» 1st phalanx	15.7	15	14.3	16.2
» 2nd phalanx	24	26	23	24
4th digit, metacarpal	33.7	33.7	31.8	34.3
» 1st phalanx	9	8.7	8.1	9
» 2nd phalanx	15	15	14	15.3
5th digit, metacarpal	35	34.2	32.6	35
» 1st phalanx	11	11	10.8	11.8
» 2nd phalanx	12	13.2	11.2	12.5
Tail	25.3	22.8	23.2	26.7
Lower leg	20.2	19.2	20	21.5
Foot, with claws	9.8	9	9.6	10.8
Skull, total length to front of c	19.8	19.3	19.8	19.9
» basilar length to front of c.	15.2	14.9	15.6	15.8
» mastoid width	9.3	8.9	9.2	9.2
» width of brain-case	8.1	7.8	8	
» zygomatic width	9	8.9	8.8	9
» maxillary width	6.1	6.2	6.3	6.7
» across cingula of c	4.2	4.3	4.7	4.8
» width of nasal swellings	5	5	5	5.1
Mandible	12.1	12.2	12.1	12.5
Upper teeth	6.5	6.7	6.7	7
Lower teeth	6.8	7.2	7.2	7.3

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(1) Proc. Zool. Soc. London 1905, II. p. 135.

Wing-indices.

	Rh. fallax.	*Rh. cognatus.*	*Rh. alcyone.*	*Rh. landeri, lobatus,* and *dobsoni.*
Forearm	1000	1000	1000	1000
3rd finger, metacarpal. .	715	723	691	675
» 1st phalanx. .	280	290	314	292
» 2nd phalanx .	392	405	537	503
4th finger, metacarpal. .	736	738	771	758
» 1st phalanx. .	221	206	171	150
» 2nd phalanx .	258	268	362	322
5th finger, metacarpal. .	722	730	771	736
» 1st phalanx. .	241	225	229	214
» 2nd phalanx .	258	268	328	301

Index of technical names of *Rhinolophi* described or commented upon in this paper.

acrotis, p. 178.
affinis, p. 180.
alcyone, pp. 187, 189, 190.
andersoni, p. 179.
andreinii, p. 191.
angolensis, p. 191.
blasii, pp. 192, 193.
brachygnathus, p. 179.
clivosus, p. 180.
cognatus, p. 181.
dobsoni, p. 189.
empusa, pp. 192, 193.
fallax, p. 173.
keyensis, p. 176.
landeri, p. 189.
lobatus, p. 188.

Explanation of Plate III.

Rhinolophus fallax; ♂ ad., type.

Fig. 1. Head; front view. Natural size.
2. Sella and connecting-process; side view. Enlarged.
3. Sella; front view. Enlarged.
4-6. Skull. Twice natural size.
7. Upper canine, p^2, and p^4. Enlarged.

Rhinolophus alcyone; ♂ ad., Cameroon.

Fig. 8. Head; front view. Natural size.
9. Sella and connecting-process; side view. Enlarged.
10. Sella; front view. Enlarged.
11-13. Skull. Twice natural size.
14. Upper canine, p^2, and p^4. Enlarged.

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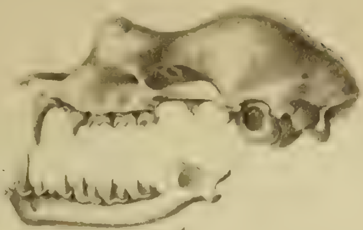
Serie 3.ª, Vol. II (XLII). 10 Maggio 1906.

GENOVA - STAB. PELLAS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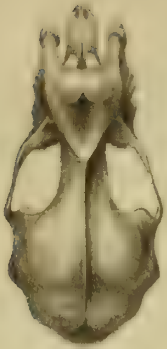
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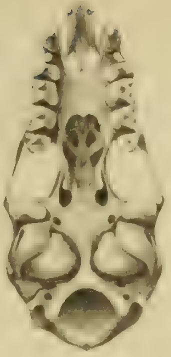
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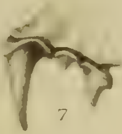
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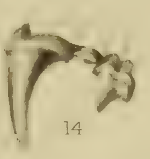
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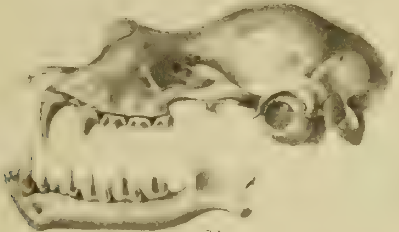
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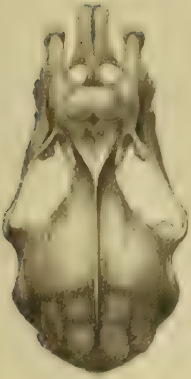
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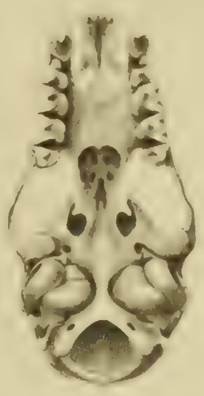
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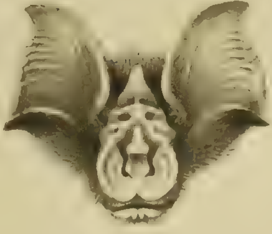
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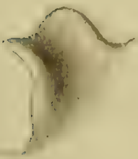
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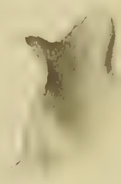
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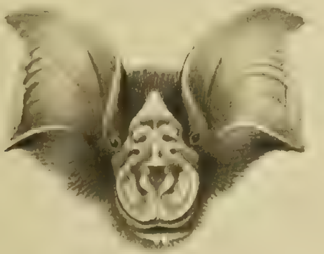
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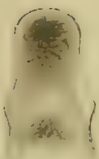
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